Red Wolf Management Series
Technical Report NO. 8

Experimental Release of Red Wolves into the Great Smoky Mountains National Park

April 6, 1990 - September 15, 1992

U.S. Fish and Wildlife Service
Southeast Region

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EXPERIMENTAL RELEASE OF RED WOLVES INTO THE GREAT SMOKY MOUNTAINS NATIONAL PARK

APRIL 6, 1990 - SEPTEMBER 15, 1992

by

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INTRODUCTION

This report is a summary of a 10-month experiment to evaluate the feasibility of reestablishing a population of red wolves (*Canis rufus*) in the Southern Appalachian Mountains (Smokies). This experiment was a cooperative effort between the U.S. Fish and Wildlife Service (Service) and the National Park Service (Park Service) within the Great Smoky Mountains National Park (Park).

The red wolf captive-breeding program and wild reintroduction project at Alligator River National Wildlife Refuge (Alligator River) proved to be very successful (Phillips 1993). Following the Alligator River release, the Service began efforts to establish a second mainland reintroduction site in order to meet the project goal of 220 wild red wolves. The Park and surrounding national forests encompass approximately 1.5 million acres of potential red wolf habitat (Figure 1). The abundance and diversity of this federally owned land base, together with strong national public interest in the area, provide an extraordinary opportunity for reintroducing a large carnivore (Parker 1990). With approximately 9 million visitors annually, the Park is the nation's most visited national park. The vast majority of visitors are very interested in nature, wildlife, and the beauty and uniqueness of the mountains. This national exposure provides an ideal setting to educate the public about wildlife resources, endangered species, and restoring the red wolf.

The reintroduction of a large carnivore into any area is a complex process. Several steps preceded the release of the wolves, including extensive public education and addressing numerous concerns from the public and various agencies. The reintroduction experiment (Project) in the Park was broken down into several phases--a coyote (*Canis latrans*) population assessment, public education and proposal presentation, and the experimental release and management of a single family unit of wolves. This report details these first three phases of the Project.

ASSESSMENT OF THE COYOTE POPULATION

One factor contributing to the demise of the red wolf was the influx of coyotes into their historic range. This led to their subsequent hybridization. Several articles and technical reports have addressed this issue and are summarized by Parker (1988). Very few areas within the historic range of the red wolf are free of coyotes. The selection of Alligator River in 1986 as the initial reintroduction site was based, in part, on the absence of coyotes in eastern North Carolina. Today coyotes are present in and around the refuge and appear to be increasing in number. Before the Smokies could be considered as a reintroduction site, an assessment of the coyote population in the Park was conducted. This assessment was conducted from January 1990 through May 1992; it provided base-line information about coyotes in the area, including home range size, habitat use, and the development of a feasible method for monitoring relative abundance (Crawford 1992).

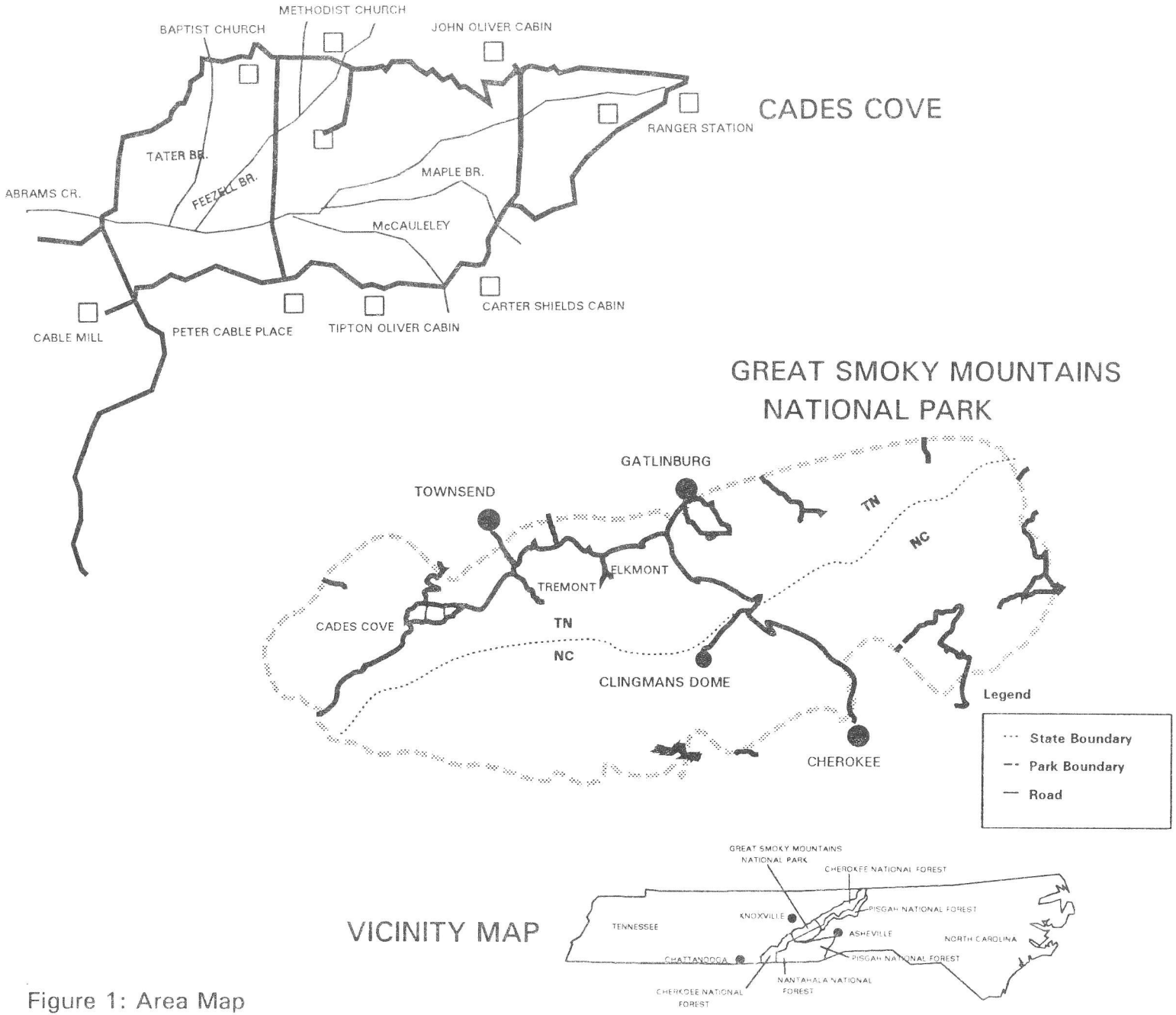

Figure 1: Area Map

PUBLIC INFORMATION AND EDUCATION

The second phase of the Project focused on public education. Red wolf history, ecology, recovery, and local public involvement were discussed prior to finalization of the reintroduction proposal. An educational package was developed, through the cooperative efforts of WBIR-TV in Knoxville, Tennessee; the Service; the Park Service; and the Southern Appalachian Man and the Biosphere Cooperative. The package was distributed free of charge to 800 schools and resource agencies; it included the Emmy Award-winning "Front Runner" video, a red wolf activity poster, and a teachers guide for elementary schools. "Front Runner" and three updated segments aired several times in the local viewing area as part of the "Heartland Series" prior to and during the experimental release. This phase of the program also included a series of meetings. Federal and State Agencies, local citizens, and various civic and special interest groups participated. These meetings were initiated for the purpose of providing background information about red wolves, the experimental reintroduction proposal, and the long-term plans for population management. Furthermore, these meetings served as a sounding board, where significant details of management policy concerning potential conflicts with livestock and sportsman interests could be discussed and criticized prior to implementation. Modifications were incorporated to satisfy local concerns while retaining program goals. This process was critical to the acceptance and support of the program, and it continues today. As a result, an information committee was formed to represent these local and regional interests and to communicate with Project personnel on a regular basis.

Key concerns voiced included the following: depredation of livestock and the Project's financial responsibility to the livestock owner, protecting livestock against wolf attacks, accidental taking of wolves and any subsequent legal repercussions, commitment and ability of personnel to monitor and manage errant wolves, and reliability of specific control methods to assure proper management. These legitimate concerns demanded complete, sincere, and tangible responses in order to assure local citizens that the wolf Project would not jeopardize their lifestyle or livelihood.

An indemnity fund was established to compensate for livestock depredation by red wolves. The fund was comprised of private donations to the National Fish and Wildlife Foundation from the National Parks and Conservation Association and other sources. These funds are held in a local account under the Park's Natural History Association. It was decided that any person suffering a legitimate loss caused by red wolves would be fully compensated. Administration of the $25,000 fund was kept at the field level, requiring signatures from both the Park superintendent and the Service's red wolf coordinator; this ensured the expedient reimbursement of funds, with minimal administrative complications.

Livestock owners were extremely concerned about the legal consequences of injuring a wolf while in the act of protecting their livestock from attack. Existing endangered species laws strictly forbid and carry harsh penalties for the taking of protected wildlife. Project officials had already classified all wolves in the Park program as experimental nonessential. This classification allowed Project personnel the freedom to customize the regulations protecting wolves to fit the specific demands of the release areas (Parker and Phillips 1991). As a direct result of input from the Tennessee Farm Bureau, a harassment clause was written into the regulations for the Park Project. This clause allows landowners to protect their property from the threat of wolves in any manner that is noninjurious to the wolf.

Immediate communication with Project or Park Service personnel is a prerequisite to any further action against the wolf. If capture attempts fail and threats continue, Project personnel and/or the livestock owner(s) are then permitted to destroy the wolf. These bold, yet simple, solutions eased the fears of most livestock owners and gained their cooperation.

Concerns were voiced by livestock and hunting interests with regard to the accidental taking of red wolves and the resulting prosecution. They expressed fears that released wolves and their offspring would be wandering onto private property and would be indistinguishable from coyotes. Regulations ensure that incidental or accidental taking of red wolves will not be prosecuted, provided the activity that resulted in taking is a legal activity and the taking is reported. In all cases, circumstances would be investigated to determine if there is any evidence of misrepresentation or intentional taking. Service personnel guaranteed that all released wolves would be fitted with radio collars. Public education efforts concentrated on using the radio collars to distinguish red wolves from other wild canids. Extensive efforts will be made to trap and collar subsequent generations of wild-born wolves for the duration of the Project. Until recovery goals are met, any wolves that avoid capture (to be fitted with a radio collar) or that repeatedly demonstrate problem behavior will be treated as expendable.

The ability of personnel to continually manage the Project under the outlined agreements was questioned. Project personnel intended that a sense of trust would be established during the experimental release and that it would be nurtured throughout the duration of the Project. For this reason, experimental release plans were again modified, reducing the number of animals to a single pack--a mated pair of adults and two of their offspring. Wild reproduction was inhibited during the experiment by performing a vasectomy on the adult male. This method was chosen over chemical inhibitors because it would not interfere with normal hormonal changes and related breeding behavior. The ability of the adult wolves to pair bond, defend a territory, and copulate would not be affected. To ensure the quick recapture of experimental animals, the adults wore radio-controlled capture collars that could be remotely activated to inject immobilizing drugs. These precautions helped to gain acceptance from individuals with livestock interests. If the 1-year experiment proved successful, the Project would proceed at a very slow pace,

releasing only the number of animals that could be intensively monitored, until the Project became well established.

OBJECTIVES OF THE EXPERIMENTAL RELEASE

Project personnel outlined the following technical objectives in order to assess the feasibility of managing a population of red wolves in the Smokies.

(1) Maintain close radio contact with the wolves in and around the Park.

(2) Delineate movement ecology and food habits of the red wolves.

(3) Assess interactions with livestock in order to determine preventive and compensatory strategies.

(4) Assess interactions with resident coyotes.

(5) Develop strategies for prevention of conflicts with public use.

ACCLIMATION AND RELEASE

Two adult pairs of red wolves were brought into the Cades Cove area of the Park and were placed in acclimation pens in January 1991. The initial release was designed to be logistically feasible, based on the most recent release data compiled at Alligator River. Mated wolves with pups are generally easier to manage than lone wolves.

Female wolf 303 and male wolf 219 produced five pups in late April 1991; two pups (female 467 and female 468) were to be released with the adults. The wolves were "soft-released" from the acclimation pen near Cades Cove on November 12, 1991. This release method consisted of leaving the pen gate open on the day of release, placing food supplements nearby, and allowing the animals to leave at their leisure. Over a period of a month, fewer supplements were provided, and the family of wolves slowly moved into Cades Cove and became self sufficient.

MONITORING

All wolves were monitored hourly for the first few weeks, using standard ground-tracking methods. Monitoring decreased to four to six locations daily as movements became more predictable. Due to the topography of the surrounding mountains, obtaining accurate ground locations on the wolves outside the Cades Cove area was difficult; at times, even impossible. Fixed-wing aircraft were then used. Determining the presence of wolves in or outside the Park was never a problem.

MOVEMENTS

Cades Cove is unique within the Park; it possesses an abundance of prey species, making it highly attractive to large predators. As a result, the average home range for the released wolves was approximately 20 square kilometers (km) (4,900 acres), slightly larger than Cades Cove (Figures 2, 3, and 4). Wolves made exploratory movements up to 16 km (10 miles) from the release site. Individuals strayed (approximately 3 km) off the Park four times (Figure 5). On two occasions the animals were recaptured within several hours; two other times they returned of their own accord within 24 hours.

FOOD HABITS

Scats were collected randomly from accessible areas frequented by the wolves. Specimens were labeled and stored in plastic bags in a freezer. At the end of the experimental period, scats were then catalogued, placed in nylon bags, and machine washed (J. Weller, Gulf Islands National Seashore, personal communication, 1993). Scats were then separated and analyzed for percent and frequency of occurrence (Table 1). White-tailed deer (*Odocoileus virginianus*) (41.1 percent) and raccoon (*Procyon lotor*) (33.3 percent) were the food items most frequently found in wolf scats.

HUMAN INTERACTIONS

The wolves were sighted on numerous occasions throughout the experiment by both visitors and Project personnel. Male 219 was captured and returned to captivity in late January 1992 because of his high tolerance of people at close distances. Female 303 was also tolerant, but to a lesser degree. She presented no serious problems and was allowed to roam free during the experiment. The two juvenile females, 467 and 468, were sighted at a distance, often crossing roads or hunting in the fields. In contrast to their parents, they developed an increasing wariness to humans as they spent more time in the wild.

Data collected from wolf releases at Alligator River has indicated that older wolves tend to have more difficulty adapting to life in the wild than younger wolves. Wolves that are born and raised in captivity often develop behavior patterns that reflect their routine interaction with human keepers or visitors. The problems presented by male 219 and female 303 could largely be attributed to their ages (8.5 and 5.5 years) and length of time in captivity (7.5 and 4.5 years) at the time of release. The adult wolves' tolerance of humans was exhibited (even magnified) in Cades Cove, where such behavior is common in wildlife species because of the large number of people who visit Cades Cove (up to 15,000 daily).

LIVESTOCK INTERACTIONS

The private land surrounding the Park and throughout the Southern Appalachians supports a variety of livestock interests. The perceived economic threat of a large predator is perhaps the greatest political

Figure 2: Home Range of Wolf 303 in GSMNP

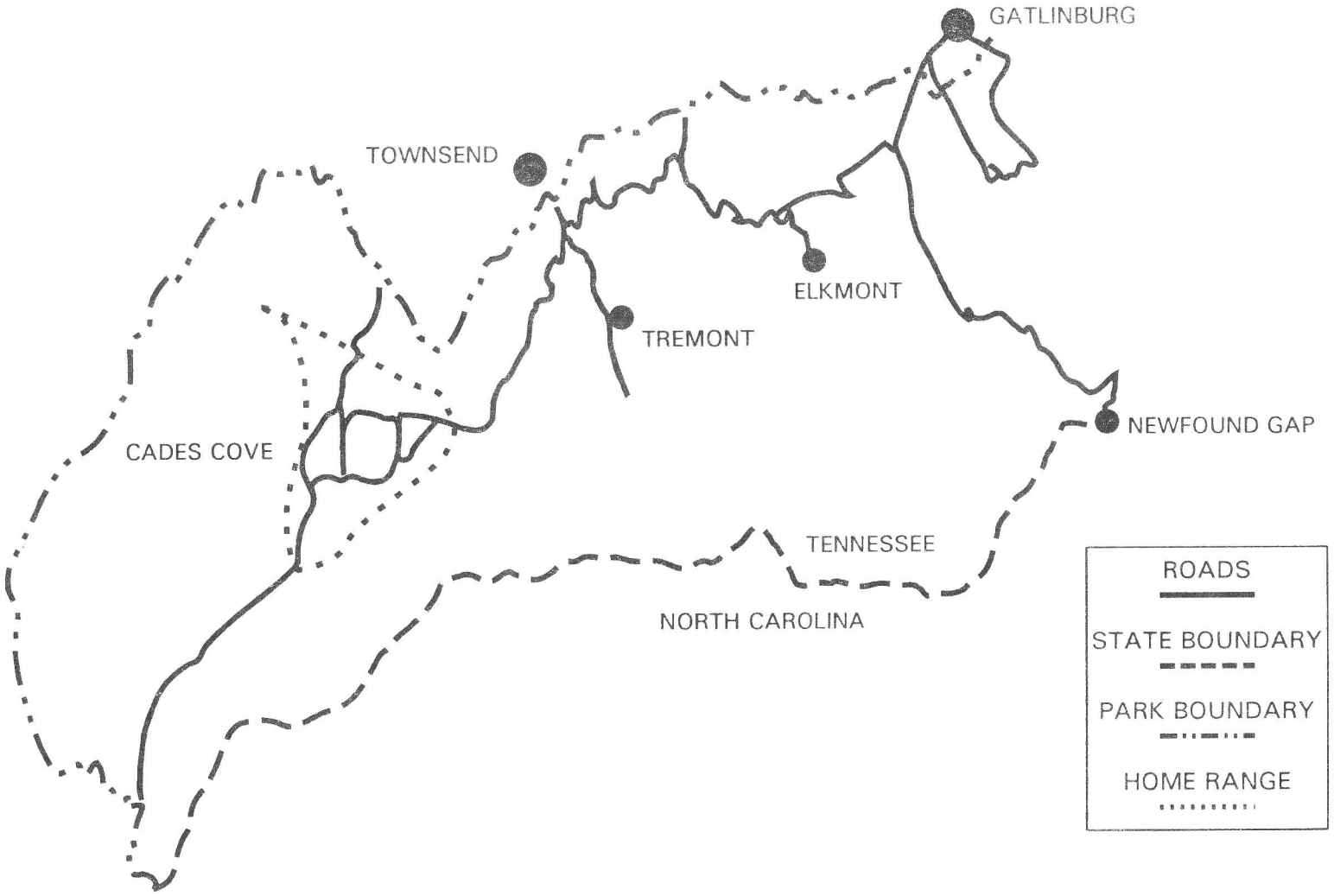

Figure 3: Home Range of Wolf 467 in GSMNP

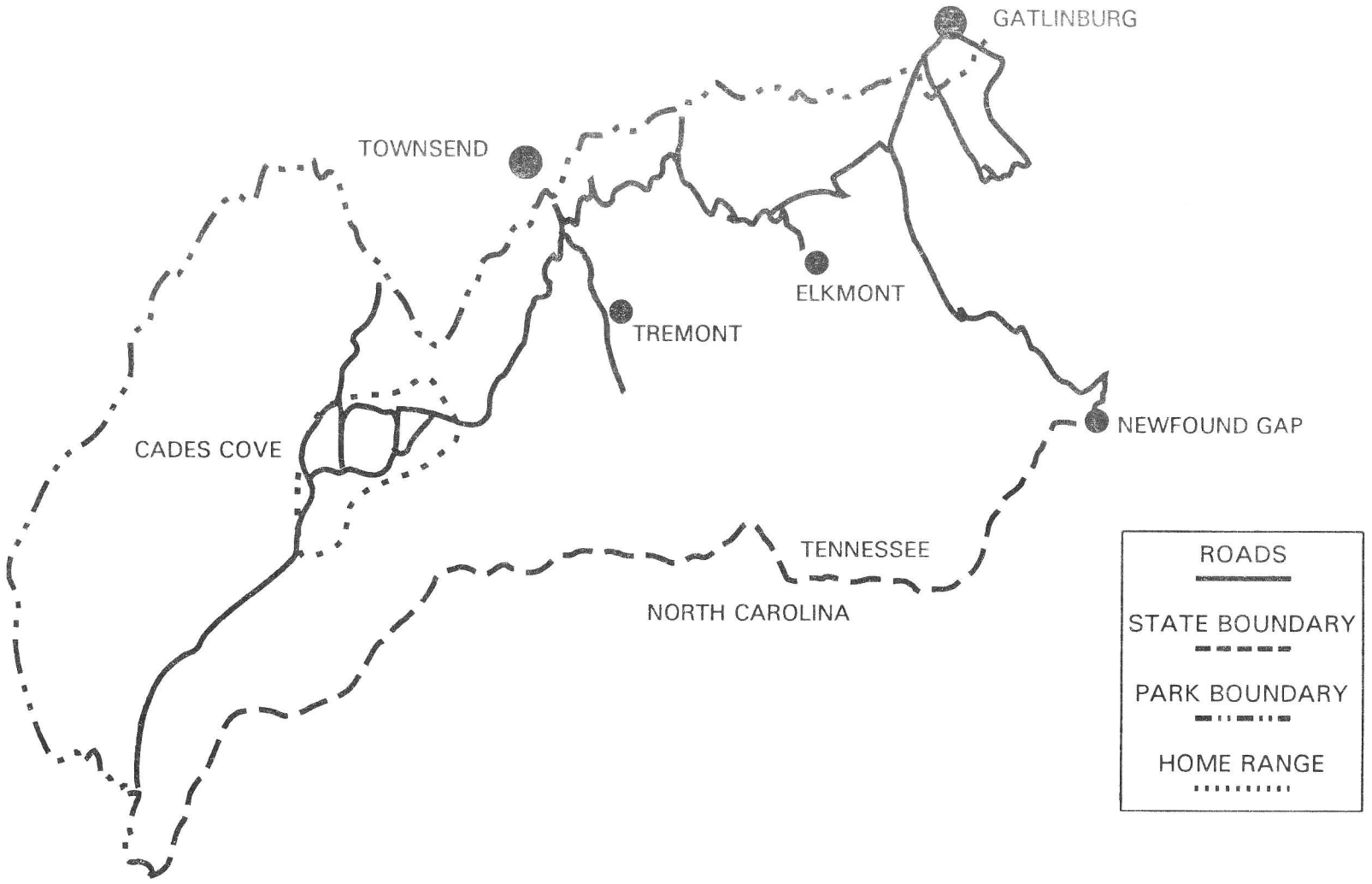

Figure 4: Home Range of Wolf 468 in GSMNP

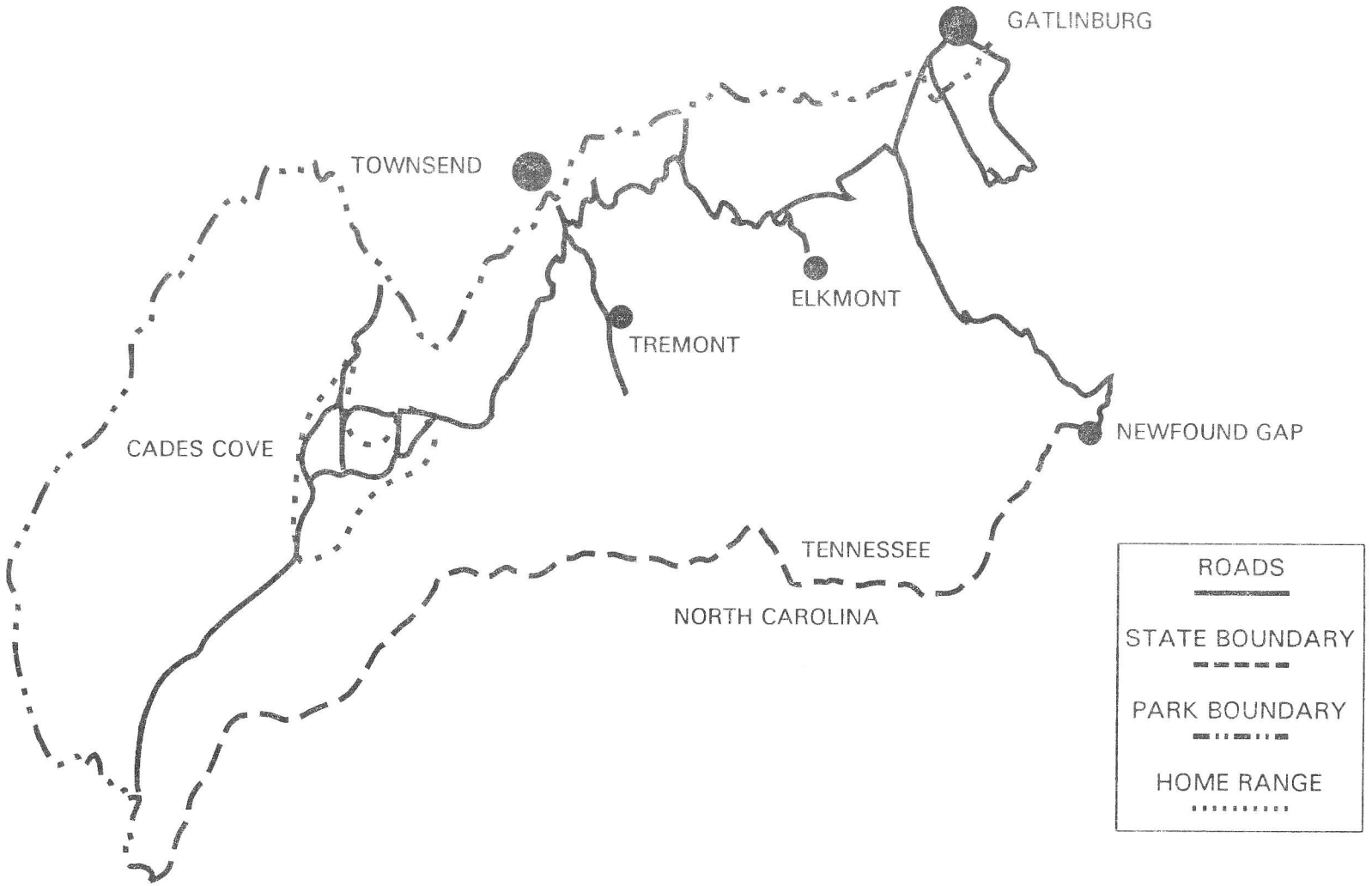

Figure 5: Locations of Wolves Outside of GSMNP During Experimental Release

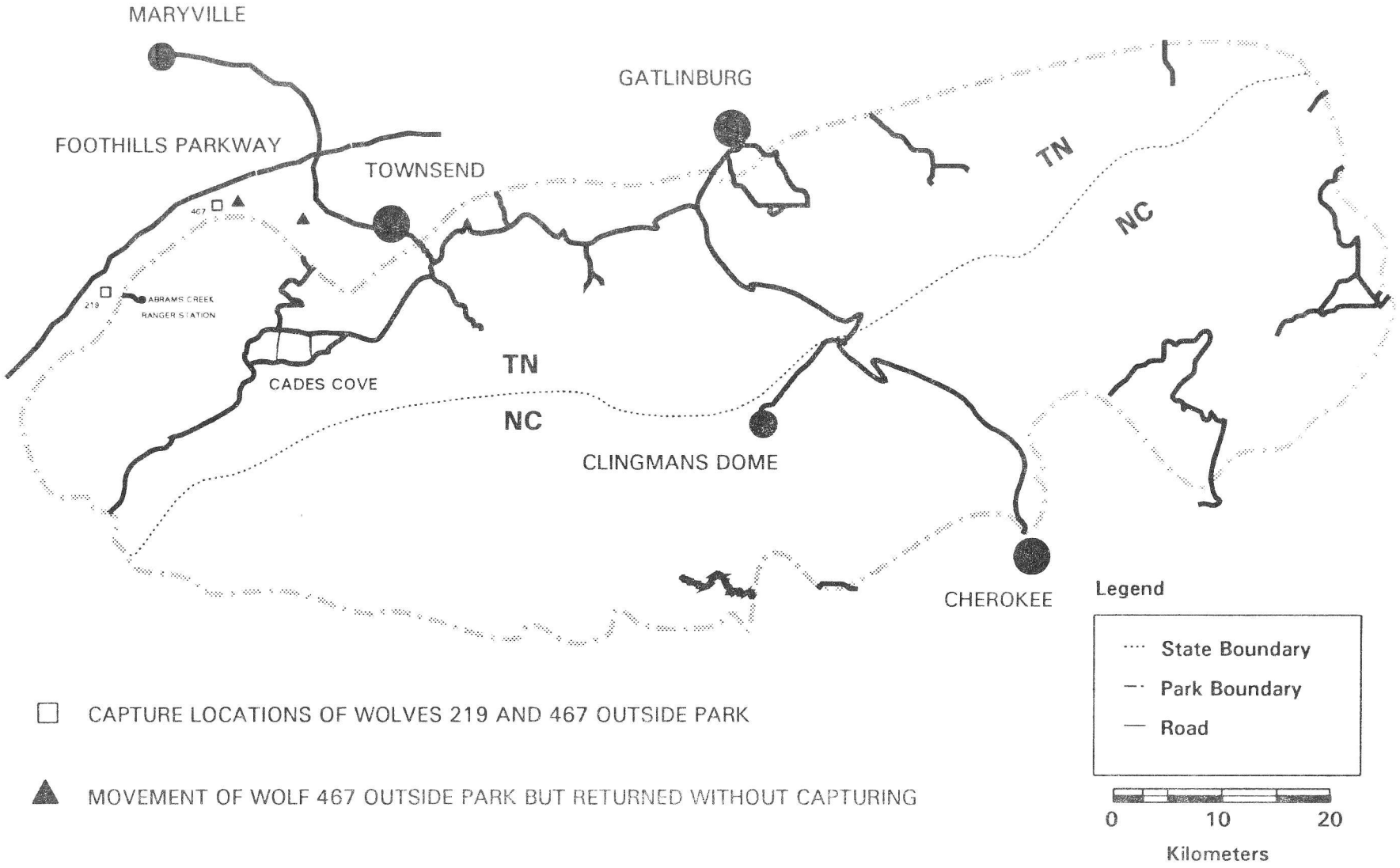

Table 1. Food items occurring in red wolf scats collected from November 1991 through September 1992.

FOOD ITEM	FREQUENCY OF OCCURRENCE	PERCENT OCCURRENCE
Deer	32	41.0
Raccoon	26	33.3
Rabbit	8	10.3
Rodent	7	9.0
Vegetation	7	9.0
Unknown mammal	6	7.7
Debris*	4	5.1
Insect	4	5.1
Calf	2	2.6
Groundhog	2	2.6
Wild hog**	2	2.6
Skunk	1	1.3
Squirrel	1	1.3
Bird	1	1.3

*Debris included foil, plastic wrappers, and various waste.
**Source of wild hog in scats was likely discarded food scraps from the captive facility.

barrier to establishing a self-sustaining red wolf population in the area.

Cades Cove supports a 500-head cattle-breeding operation that is leased to a private livestock owner. Calves are born year-round in 800 acres of pasture and are allowed to roam with the cows. Accurate records of lost cows and calves prior to the experimental release of wolves were not kept. The livestock owner estimated that 5 to 10 calves per year were lost to bears, coyotes, and other scavengers. During the calving period, cattle were intensely monitored to determine numbers of calves born and when and where they were born. During this period, six calf depredation attempts occurred. Coyotes were observed consuming a recently killed calf. Two calves suffered severe injuries from canid attacks. In the remaining three instances of depredation, cattle disappeared without personnel being able to locate a carcass or find any direct evidence of the predator involved. In two of the three disappearances and in the two calf injuries, the wolves were monitored continuously and were located disjunct from the general area of the depredations. Based on circumstantial evidence (wolves returning, for several days, to the area where the cattle disappeared), the wolves were the likely candidates in only one disappearance of a calf. In other instances, day and night observations of the fields revealed cooperative hunting by small groups of coyotes. Nightly spotlight observations by the livestock owner also revealed continuous coyote activity in the calving pastures. All six calves taken were less than 1 week old. All depredations occurred along the edges of woods and where calves were separate from the herd. Project personnel began assisting the livestock owner with moving newborn calves and cows into the main herd; no further depredations occurred.

Male wolf 219 was responsible for taking one chicken and three domestic turkeys in two separate incidents. The remaining three wolves were believed to have taken one newborn calf. Reimbursements for the chicken and calf totaled $253. Offers to reimburse for the loss of the turkeys were declined by the owner.

CURRENT STATUS

In late September 1992 the three remaining wolves were recaptured and placed back into captivity. The Service reviewed and presented their findings to the Park Service and members of the local information committee. The decision was made to proceed with the reintroduction effort at a conservative pace. In October 1992 six wolves (two adults and four juveniles) were released into Cades Cove. In December 1992 a second family of six wolves was released from a remote site in the backcountry, several kilometers east of Cades Cove. All wolves were fitted with radio collars and are monitored daily. There are no scheduled plans to recapture these animals, except to replace the radio collars or to return an animal that leaves the Park.

LITERATURE CITED

Crawford, B. A. 1992. Coyotes in Great Smoky Mountains National Park: Evaluation of methods to monitor relative abundance, movement ecology, and habitat use. M.S. Thesis, University of Tennessee, Knoxville, TN. 84 pp.

Parker, W. T. 1988. A historic perspective of *Canis rufus* and its recovery potential. Red Wolf Management Series Technical Report No. 3, U.S. Fish and Wildlife Service. Atlanta, GA. 17 pp.

Parker, W. T. 1990. A proposal to reintroduce the red wolf into the Great Smoky Mountains National Park. Red Wolf Management Series Technical Report No. 7, U.S. Fish and Wildlife Service. Atlanta, GA. 33 pp.

Parker, W. T., and M. K. Phillips. 1991. Application of the experimental population designation to recovery of endangered red wolves. Wildlife Society Bulletin 19:73-79.

Phillips, M. K. 1993. Red wolf research program in the Alligator River National Wildlife Refuge. Pages 28-48 *in* J. J. Johnson, ed. 1992 Alligator River National Wildlife Refuge Annual Report. U.S. Fish and Wildlife Service, Manteo, NC. 71 pp.